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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,231	11/28/2000	Krishna Balachandran	LUC-280/Balachandran 15-4	6529
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PATTI & BRILL ONE NORTH LASALLE STREET 44TH FLOOR CHICAGO, IL 60602			ART UNIT 2634	
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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/724,231

Applicant(s)

BALACHANDRAN ET AL.

Examiner

Edith M Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-7, and 21-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, line 5, “comparing the *symbol or bit error probability* to one or more predetermined thresholds” is not taught in the specification wherein the “*mean symbol error probability*” in page 6 line 3 of the specification or “*mean error rate*” in the step 512 FIG.5 is compared to thresholds.

Claim 22, “the *first communication protocol*...exceeding a *first threshold* of the one or more predetermined thresholds” and “a *second communication protocol*...exceeding a *second threshold* of the one or more predetermined thresholds” are not taught in the written description.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 22, implementing the first communication protocol upon the symbol or bit error probability exceeding a first threshold of the one or more predetermined thresholds and implementing a second communication protocol upon the symbol or bit error probability exceeding a second threshold of the one or more predetermined thresholds will render the claim to indefinite. When the "one or more predetermined thresholds" is one predetermined threshold, it renders the claim to indefinite, since in this case the method has one threshold, doesn't have a first threshold and a second threshold upon the symbol or bit error probability exceeding.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-5, 7, 9-11, and 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Servais et al. (US 6141388) in view of Ngoc et al. (US 6539031 B1).

Regarding **claim 1**, except explicitly specify comparing the error probability to one or more predetermined thresholds to select a communication protocol of the communication channel, Servais et al. discloses a method comprising the steps of: determining a soft decision metric at a receiver for a plurality of symbols transmitted over a communication channel

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(VITERBI ALGORITHM FIG.3, column 1 lines 50-60, column 3 lines 45-50, where the soft decision metric at a receiver for a plurality of symbols); and employing the soft decision metric to determine symbol or bit error probability (104-106 FIG.7, column 4 lines 20-27, where the mean error rate estimate as the moving average of error probability). However Ngoc et al. teaches comparing the error probability to one or more predetermined thresholds to select a communication protocol of the communication channel (Abstract, column 3 lines 43-63 wherein altering the modulation scheme, error correction coding, spectrum spreading, the power level, or the data transmission rate/different rate packets for transmitting the radio frames is altering the communication protocol of the communication channel, column 4 lines 2-6, lines 9-14, wherein different thresholds are compared). As Servais et al.'s invention providing the bit error rate estimate to select different communication channel (column 4 lines 39-48 '388), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Ngoc et al.'s teaching in Servais et al.'s quality determination method and system to chose different communication channel with its communication protocol in response to environmental and data traffic conditions (column 1 lines 14-17). The integrated method improves the adaptability of the environmental and data traffic condition of the wireless communication and provides an efficiently and cost effectively technique to communicate data over a wireless link (column 1 lines 14-19, column 2 lines 19-21).

Regarding **claim 2**, Servais et al. discloses observing the output of the communication channel (COMMUNICATION CHANNEL-DEMODULATION/EQUALIZATION FIG.3, where the observation is performed); and determining a derived probability for each one of the plurality of transmitted symbols through employment of a set of observations at the output of the

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communication channel (DEMODULATION/EQUALIZATION-CONVOLUTIONAL DECODING (VITERBI ALGORITHM FIG.3, 102-104 FIG.7, where deriving probability through employment of a set of observations at the output of the communication channel is performed).

Regarding **claim 3**, Servais et al. discloses deriving an error rate estimate as a moving average of the symbol or bit error probability (104-106 FIG.7, column 4 lines 20-27, where the mean error rate estimate as the moving average of error probability).

Regarding **claim 4**, Servais et al. discloses the error rate estimate in providing feedback to a transmitter (column 4 lines 40-48, where the error rate estimate feeds back via control node to the transmitter to adjust the power or the strength of the FEC, column 6 lines 41-45 where the feedback is provided).

Regarding **claim 5**, Servais et al. discloses deriving the soft decision metric from an output of at least one of an equalizer and a demodulator (DEMODULATION/EQUALIZATION-CONVOLUTIONAL DECODING (VITERBI ALGORITHM FIG.3, 102-104 FIG.7, where the soft decision metric from an output of at least one of an equalizer and a demodulator).

Regarding **claim 7**, Servais et al. discloses the transmitted symbols comprising binary values (column 1 lines 30-39).

Regarding **claim 9**, Servais et al. discloses employing the error probability to select a communication protocol at the transmitter (column 4 lines 40-50, where the transmitter adjusts the power of the transmitted signal or the strength of a FEC).

Regarding **claim 10**, Servais et al. discloses employing the error probability to select a communication protocol is performed at the receiver (column 6 lines 41-55, it performs at the

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receiver as well, the receiver can be the receiver of the mobile terminal or the receiver of the base station).

Regarding **claim 11**, Servais et al. discloses selecting at least one of a modulation scheme, a coding scheme, symbol rate, and power level (column 4 lines 40-50, the power level or the strength of a FEC).

Regarding **claim 13**, except explicitly specify comparing the error probability to one or more predetermined thresholds to select a communication protocol of the communication channel, Servais et al. discloses a system (FIG.2) comprising: a transmitter that transmits a plurality of symbols over a communication channel (26 FIG.2, TRANSMITTER FIG.3); a receiver that receives a plurality of symbols over the communication channel (22 FIG.2, RECEIVER FIG.3); a decision device that provides a plurality of soft decision metrics (44-50 FIG.2, DEMODULATION/EQUALIZATION-CONVOLUTIONAL DECODING FIG.3); a processor that obtains an error rate estimate (49 FIG.2, CALCULATE ACTUAL CHANNEL BER-MAP VITERBI METRIC TO BER FIG.3) from the soft decision metrics. However Ngoc et al. teaches comparing the error probability to one or more predetermined thresholds to select a communication protocol of the communication channel (Abstract, Fig. 1, Fig. 3, & Fig. 4, column 3 lines 43-63 wherein altering a modulation scheme, error correction coding, spectrum spreading, a power level, or a data transmission rate/different rate packets for transmitting the radio frames is altering the communication protocol of the communication channel, column 4 lines 2-6, lines 9-14, wherein different thresholds are compared). As Servais et al.'s invention providing the bit error rate estimate to select different communication channel (column 4 lines 39-48 '388), at the time of the invention, it would have been obvious to a person of ordinary skill

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in the art to have the Ngoc et al.'s teaching implemented in Servais et al.'s quality determination system to chose different communication channel with its communication protocol. The integrated system is improved the adaptability of the environmental and data traffic condition of the wireless communication (column 1 lines 14-19).

Regarding **claim 14**, Servais et al. discloses a feedback link that communicates an error rate estimate from the receiver to the transmitter (22-30-26-28-26-30 FIG.1 is the feedback link, column 4 lines 40-48, column 6 lines 38-55).

Regarding **claim 15**, Servais et al. discloses the transmitter or the receiver that changes a communication protocol in response to the error rate estimate (28/22/26 FIG.1 is one selector circuit that changes a communication protocol in response to the error rate estimate, column 4 lines 40-48, column 6 lines 38-55, where the base station, mobile terminal, or MTSO/control node can be the selector circuit).

Regarding **claim 16**, the combination of Servais et al. with Ngoc et al.'s teaching discloses transmitter or the receiver changes one or more of a modulation and coding scheme in response to the error rate estimate (Abstract, column 3 lines 43-63 wherein altering the modulation scheme, error correction coding, spectrum spreading, the power level, or the data transmission rate/different rate packets for transmitting the radio frames).

Regarding **claim 17**, Servais et al. discloses the decision device comprising one or more of a demodulator and an equalizer (DEMODULATION/EQUALIZATION FIG.3).

Regarding **claim 18**, Servais et al. discloses the decision device performing demodulation through employment of a Viterbi decoder algorithm or a variant (DEMODULATION/EQUALIZATION-CONVOLUTINAL DECODING FIG.3).



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Regarding **claim 19**, Servais et al. discloses the decision device performing equalization through employment of one or more of a BCJR algorithm, a soft output Viterbi algorithm, or variants (EQUALIZATION-CONVOLUTIONAL DECODING (VITERBI ALGORITHM) FIG.3).

Regarding **claim 20**, Servais et al. discloses an article (FIG.2/FIG.7), comprising: a computer-readable signal-bearing medium (49 FIG.2); means for determining a soft decision metric at a receiver (46 FIG.2, 104 FIG.7); and means for employing the soft decision metric to determine symbol or bit error probability (50 FIG.2).

7. Claims 6, 21, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Servais et al. (US 6141388) in view of Ngoc et al. (US 6539031 B1) as applied to claim 1, claim 13, and claim 20 above, and further in view of Khayrallah et al. (US 6597743 B1).

Regarding **claim 6**, Servais et al. does not explicitly specify a log likelihood ratio, however Khayrallah et al. teaches a log likelihood ratio (108 FIG.4, column 5 lines 42-55). As Servais et al. using the convolutional decoding, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the log likelihood ration taught by Khayrallah et al. in Servais et al.'s determining the soft decision metric to have a reduced search symbol estimation algorithm (Abstract, column 1 lines 5-10).

Regarding **claims 21, 23 & 25**, Servais et al. discloses observing the output of the communication channel (COMMUNICATION CHANNEL-DEMODULATION/EQUALIZATION FIG.3, where the observation is performed), however does not specify generating a probability mass function in the convolutional decoding (Viterbi algorithm). Khayrallah et al. teaches generating a probability mass function (column 5 lines 35-55, wherein the posteriori probabilities

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is the probability mass function). As Servais et al. using the convolutional decoding (Viterbi decoding wherein the probability mass function is needed), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the probability mass function taught by Khayrallah et al. provided to the decoder to obtain estimates of the information symbols to have the soft decision metric to have a reduced search symbol estimation algorithm (Abstract, column 1 lines 5-10).

8. Claims 22, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Servais et al. (US 6141388) in view of Ngoc et al. (US 6539031 B1) and as applied to claim 1, claim 13, and claim 20 above, and further in view of Yao (US 6400724 B1).

Regarding claims 22, 24, & 26, the combined/modified Servais et al.'s method with Ngoc et al. teaches implements the first communication modulation scheme upon the symbol or bit error probability exceeding a first threshold of one or more predetermined thresholds; and implementing the second communication modulation scheme upon the symbol or bit error probability exceeding a second threshold (column 3 lines 22-32 '031), but not explicitly specify implementing the first communication protocol upon the error probability exceeding a first threshold and a second communication protocol upon the error probability exceeding a second threshold. However Yao teaches on different protocol having different permissible error rate/the threshold (column 5 lines 40-57) in wireless system. As Ngoc et al. monitoring a bit error rate associated with radio frames communicated via the wireless link and activate the technique for altering the manner in which the radio frames are communicated in response to the bit error rate (column 4 lines 1-18) and implementing the first modulation scheme upon the symbol or bit

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error probability exceeding a first threshold of one or more predetermined thresholds; and implementing the second communication modulation scheme upon the symbol or bit error probability exceeding a second threshold as one of results of activating the technique for altering the manner in which the radio frames are communicated in response to the bit error rate, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implementing the first communication protocol upon the symbol or bit error probability exceeding a first threshold of one or more predetermined thresholds; and implementing the second communication protocol upon the symbol or bit error probability exceeding a second threshold according to the Yao's teaching in Ngoc et al.'s method that different protocols having different permissible error rate/the threshold. The combined system/method increases the probability of successful data transmission (Abstract) over wireless links.

### *Conclusion*

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Chang whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edith Chang  
April 19, 2004



STEPHEN CHIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600